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IS 11926 (1987): Polyamide Tyre Cord Warp Sheet for  
Automotive Tyres [TXD 33: Industrial Fabrics]

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**IS : 11926 - 1987**

*Indian Standard*

**SPECIFICATION FOR  
POLYAMIDE TYRE CORD WARP SHEET  
FOR AUTOMOTIVE TYRES**

UDC 677·072·6 : 629·11·012·553·1

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**BUREAU OF INDIAN STANDARDS**  
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**Gr 2**

*June 1987*

**TABLE 1 REQUIREMENTS OF POLYAMIDE CORDS FOR  
WARP SHEET FOR AUTOMOTIVE TYRES**  
( Clause 4.1 )

VARIETY NO.	NOMINAL LINEAR DENSITY OF YARN	NO. OF PLIES	LINEAR DENSITY OF CORD	TWIST PER METRE		STRENGTH ON Plied (Z twist)	PERCENTAGE ELONGATION AT			THICKNESS mm (13)		
				Singles			Predetermined Load					
				TEX	TEX		(5)	(6)	(7)			
1	94	2	210	475	475	132	13	—	—	0.56		
2	94	2	215	500	500	130	14	—	—	0.57		
3	140	2	318	390	390	200	—	13	—	0.68		
4	140	3	480	315	315	295	—	—	13.5	27.5		
5	188	2	420	335	335	265	—	—	13	0.78		
6	210	2	480	315	315	295	—	—	13.5	0.80		
TOLERANCE	—	—	±2.5 percent	16	±16	—	—	—	±2	±0.04		
METHOD OR TEST	IS 5910 (Part 2) : 1989*	—	IS 4910 (Part 2) : 1989*	IS 832 : 1985†	IS 4910 (Part 3) : 1989†	IS 4910 (Part 3) : 1989†	IS 4910 (Part 3) : 1989‡	IS 4910 (Part 8) : 1989§	IS 4910 (Part 8) : 1989§			

NOTE — 1 N = 0.102 kgf approximately.

• Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 2 Linear density (first revision).

† Methods for determination of twist in yarn (first revision).

‡ Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 3 Load and elongation characteristics (first revision).

§ Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 8 Thickness (first revision).

(TXD 24,

## AMENDMENT NO. 2 AUGUST 1991

TO

### IS 11926 : 1987 SPECIFICATION FOR POLYAMIDE TYRE CORD WARP SHEET FOR AUTOMOTIVE TYRES

( This amendment is being issued to include the requirements of elongation at break of the tyre cord warp sheet, Table is being substituted incorporating Amendment No. 1, November 1988. )

( *Page 3, clause 2.1* ) — Substitute 'IS 4910 ( Part 1 ) : 1989\*' for 'IS 4910 ( Part 6 ) - 1970'.

( *Page 4, clause 3.1, line 2* ) — Substitute 'yarn of Nylon 6 or Nylon 6.6' for 'polyamide yarn of type 6.6 or 6.'

( *Page 5, Table 1* ) — Substitute the table given on page 2 for the existing table.

( *Page 6, clause 4.2, Informal Table, third column* ) — Substitute 'IS 1954 : 1990†' for 'IS 1954 - 1969'.

( *Page 6, clause 4.3* ) — Substitute the following for the existing clause:

'4.3 The requirements of tyre cord for heat shrinkage and heat shrinkage, heat degradation and creep characteristics shall also be as agreed to between the buyer and the seller.

4.3.1 The test shall be carried out as per the method given in IS 4910 ( Part 5 ) : 1989‡, IS 4910 ( Part 7 ) : 1989§ and IS 4910 ( Part 10 ) : 1989|| respectively.'

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\*Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 1 Definitions and terms (*first revision* ).

†Methods for determination of length and width of fabrics (*second revision* ).

‡Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 5 Heat shrinkage and heat shrinkage force (*first revision* ).

§Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 7 Heat degradation (*first revision* ).

||Methods of test for tyre yarns, cords and tyre cord warpsheets made from man-made fibres : Part 10 Creep (*first revision* ).

**AMENDMENT NO. 3 JANUARY 1993**  
**TO**  
**IS 11926 : 1987 SPECIFICATION FOR POLYAMIDE**  
**TYRE CORD WARP SHEET FOR AUTOMOTIVE**  
**TYRES**

[ *Page 6, clause 4.3 ( see also Amendment No. 2 )* ] — Substitute the following for the existing clause:

'4.3 The requirements of tyre cord for heat shrinkage and heat shrinkage force, heat degradation and creep characteristics shall also be as agreed to between the buyer and the seller.'

[ *Page 5, Table 1, col 2 ( see also Amendment No. 2 )* ]:

i) Substitute the heading 'Nominal Linear Density of Yarn' for 'Nominal Linear of Yarn'.

ii) Substitute 'IS 4910 ( Part 2 ) : 1989\*' for 'IS 5910 ( Part 2 ) : 1989\*' against 'Method of Test'.

[ *Page 5, Table 1, col 12 ( see also Amendment No. 2 )* ] — Substitute the following for the existing matter against the Variety No. 1 to 6':

**BREAKING LOAD**  
(12)

27.5  
27.5  
27.5  
27.5  
27.5  
27.5

( TX D 24 )

**AMENDMENT NO. 1 NOVEMBER 1988**

**TO**

**IS : 11926-1987 SPECIFICATION FOR POLYAMIDE TYRE CORD  
WARP SHEET FOR AUTOMOTIVE TYRES**

( This amendment is being issued to correct the direction of twist in singles and plied yarn as given in Table 1. )

( *Page 5, Table 1* ) — Amend the direction of twist given in col 5 and 6 as given below:

*Singles*

( Z Twist )

*Plied*

( S Twist )

( TDC 49 )

# Indian Standard

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*( Continued on page 2 )*

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*Indian Standard*

**SPECIFICATION FOR  
POLYAMIDE TYRE CORD WARP SHEET  
FOR AUTOMOTIVE TYRES**

**0. FOREWORD**

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 6 March 1987, after the draft finalized by the Industrial Textiles Sectional Committee had been approved by the Textile Division Council.

**0.2** In view of the wide usage of polyamide tyre cord in the manufacture of automotive tyres in the country, an urgent need has been felt for formulating an Indian Standard on the subject.

**0.3** For the purpose of deciding whether a particular requirement of this standard is complied with the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS:2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1. SCOPE**

**1.1** This standard prescribes the requirements of six varieties of grey polyamide tyre cord warp sheet used in the manufacture of automotive tyres.

**2. TERMINOLOGY**

**2.1** For the purpose of this standard the following definitions in addition to those given in IS: 4910 (Part 6)-1970† shall apply.

**2.1.1** *Tyre Cord* — A particular construction of filaments of polyamide, used as the structural reinforcement of pneumatic tyres.

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\*Rules for rounding off numerical values (*revised*).

†Method of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 6 Definitions of terms.

**2.1.2 Tyre Cord Warp Sheet** — A planer textile structure consisting of tyre cord warp with widely spaced weft threads. The latter merely serving to hold the warp cords in position for processing.

### 3. MANUFACTURE

**3.1 Yarn** — The yarn used for the manufacture of tyre cord shall be continuous filament polyamide yarn of type 6·6 or 6. The yarn should be satisfactory in evenness and reasonably free from defects, such as undrawn yarn, broken filaments, oil stains and other extraneous material.

**3.2 Tyre Cord** — The tyre cord shall be made out of 2 or 3 yarns as stated in 3.1 by plying these together by applying necessary twist. The tyre cord shall be well and evenly twisted and shall be reasonably free from defects, such as knots, slubs, kinks, etc, that would affect the serviceability of the cord.

**3.3 Cord Joints** — Cord joints shall be sewn spliced or air spliced in such a manner as to obtain at least 85 percent of the minimum breaking load specified for the cord at the joined portion. The maximum number of sewn joints for a particular length of cord shall be subject to agreement between the buyer and the seller.

**3.4 Weft Yarn** — The weft yarn used in the manufacture of warp sheet shall be made out of cotton or other suitable fibre with a linear density of 14 to 30 tex (20s to 42s count).

**3.5 Tab (or Header)** — Tabs (or headers) shall be provided at each end of the warp sheet roll and at intermediate positions in the roll as agreed to between the buyer and the seller.

**3.6 Tabby** — One tabby shall be provided for each creel load or for a suitable number of rolls as agreed to between the buyer and the seller.

### 4. REQUIREMENTS

**4.1** Tyre cords of different varieties, as used in the warp sheets, shall conform to the requirements given in Table 1.

**4.2** The constructional particulars of the warp sheet, namely, end/dm, picks/dm, fibre used in the weft, total number of ends, linear density of weft, roll length and width and mass ( $\text{g}/\text{m}^2$ ) shall be as agreed to between the buyer and the seller subject to the following tolerances

**TABLE I REQUIREMENTS OF POLYAMIDE CORDS FOR WARP SHEET FOR AUTOMOTIVE TYRES**  
( Clause 4.1 )

VARIETY No.	LINEAR DENSITY of YARN, Tex	No. of PILES	LINEAR DENSITY of CORD, Tex	TWIST PER METRE		BREAKING STRENGTH ON 25 cm TEST LENGTH, Min, N	ELONGATION AT PRE- DETERMINED LOAD, Percent	THICKNESS mm
				Singles (z Twists)	Plied (z Twists)			
1	94	2	210	475	475	132	—	—
2	94	2	215	500	500	130	14	—
3	140	2	318	395	395	200	—	—
4	140	3	480	315	315	295	—	—
5	188	2	420	335	335	265	—	—
6	210	2	480	315	315	295	—	—
<b>5</b> TOLER- ANCE percent				± 2.5	—	± 16	—	± 2 percent
METHOD	IS : 4910 or Tex ( Part 1 )-1968*	—	IS : 4910 ( Part 1 )-1968*	IS : 832-1985†	IS : 4910 ( Part 2 )- 1968‡	IS : 4910 ( Part 2 )- 1968§	IS : 4910 ( Part 2 )- 1968‡	IS : 4910 ( Part 8 )-1970§

Note — 1 N = 0.102 kgf approximately.

\*Methods of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 1 Linear density.

†Methods for determination of twist in yarn (*first revision*).

‡Methods of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 2 Breaking load, elongation at break and tenacity.

§Methods of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 3 Thickness (gauge).

when tested as per the test method indicated against corresponding characteristic:

<i>Characteristic</i>	<i>Tolerances</i>	<i>Method of Test, Ref to</i>
Ends/dm	± 1.25 percent	IS : 1963-1981*
Picks/dm	± 10 percent	IS : 1963-1981*
Width, mm	± 20 mm	IS : 1954-1969†
Mass, g/m <sup>2</sup>	± 3 percent	IS : 1964-1970‡
Total number of warp ends	Nil	—

**4.3** The requirements of tyre cord for heat shrinkage, heat shrinkage force, heat degradation and growth characteristics shall also be as agreed to between the buyer and the seller. The test shall be carried out as per the method given in IS : 4910 ( Part 4 )-1970§, IS : 4910 ( Part 7 )-1971|| and IS : 4910 ( Part 10 )-1971¶.

## **5. PACKING**

**5.1** Unless otherwise agreed to between the buyer and the seller, the tyre cord warp sheet shall be packed as given in **5.2**.

**5.2** Warp sheet shall be attached to a roller of suitable dimensions and wound evenly and tightly on to the roller. The roll shall be covered with at least one layer of polyethylene film of minimum 80 micron thickness (*see IS : 2508-1984\*\**) and finally wrapped in one layer of hessian cloth conforming to Type 1 of IS : 2818 ( Part 2 )-1971†† or any other sacking cloth. Discs of suitable size shall be applied at

\*Method for determination of threads per unit length in woven fabrics (*second revision*).

†Method for determination of length and width of fabrics (*first revision*).

‡Method for determination of weight per square metre and weight linear metre of fabrics (*first revision*).

§Method of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 4 Heat shrinkage and heat shrinkage force.

||Method of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 7 Heat degradation.

¶Method of test for tyre yarns; cords and tyre cord fabrics made from man-made fibres: Part 10 Growth.

\*\*Specification for low density polyethylene films (*second revision*).

††Specification for Indian hessian: Part 2 305 and 229 g/m<sup>2</sup> at 16 percent contract regain (*first revision*).

the roll ends and final wrapping layer of hessian/sacking cloth shall be securely sewn in order to protect the roll from contamination of ingress of moisture or physical damage.

## 6. MARKING

**6.1** Each roll of tyre cord warp sheet shall be suitably identified to indicate variety of cord, date of manufacture, length, mass of roll and name or trade-mark of the manufacturer.

**6.2** Each roll may also be marked with the Standard Mark.

NOTE—The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

## 7. SAMPLING

**7.1** The sampling and criteria for conformity of tyre cord warp sheet shall be as prescribed in IS : 4910 ( Part 12 )-1981\*.

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\*Methods of test for tyre yarns, cords and tyre cord fabrics made from man-made fibres: Part 12 Sampling for tyre yarns, cords and tyre cord fabrics made from polyamide.

## INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

### **Base Units**

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

### **Supplementary Units**

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

### **Derived Units**

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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